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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DMITRY RAGOZIN and
ALEXANDER SAPATOV

Appeal 2016-008414
Application 13/977,279[1]
Technology Center 2600

Before MAHSHID D. SAADAT, JAMES W. DEJMEK, and MATTHEW J. McNEILL, *Administrative Patent Judges*.

DEJMEK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from a Final Rejection of claims 29–53. Claims 1–28 have been canceled. *See* Amend. at 3, mailed June 26, 2015. We have jurisdiction over the remaining pending claims under 35 U.S.C. § 6(b).

We reverse.

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[1] Appellants identify Intel Corporation as the real party in interest. App. Br. 2.

STATEMENT OF THE CASE

Introduction

Appellants' claimed invention is directed to content-aware image resizing using superpixels. Spec. ¶ 17. According to the Specification, a superpixel "may correspond to any number of pixels of [an] image." Spec. ¶ 27. In a disclosed embodiment, an image is segmented into a plurality of superpixels and a target region including the pixels corresponding to a seam of superpixels extending across a dimension of the image is selected. Spec. ¶ 17. Additionally, a seam of pixels in the target region is selected. Spec. ¶ 17. The image may be resized by removing or augmenting the seam of pixels. Spec. ¶ 17.

Claim 29 is illustrative of the subject matter on appeal and is reproduced below with the disputed limitations emphasized in *italics*:

> 29. A computing device comprising:
>
> a camera; and
>
> an image co-processor to (i) segment an image captured by the camera into a plurality of superpixels, each of the plurality of superpixels corresponding to a plurality of pixels of the image, (ii) *select a seam of superpixels in the image* extending across a dimension of the image, (iii) *select a seam of pixels within the seam of superpiexels,* [sic] the seam of pixels extending across the dimension of the image, and (iv) resize the image by removing or augmenting the seam of pixels.

The Examiner's Rejections

1. Claims 29, 32–38, 41–45, and 48–53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hong (US 2007/0116347 A1; May 24, 2007); Fabio Drucker and John MacCormick, *Fast Superpixels for Video Analysis*, Proceedings of the 2009 International Conference on Motion

and Video Computing, 2009 WMVC '09, 55–62 (2009) ("Drucker"); Avidan et al. (US 2010/0027876 A1; Feb. 4, 2010) ("Avidan"); and Radhakrishna Achanta and Sabine Süsstrunk, Saliency Detection for Content-Aware Image Resizing, Proceedings of the 16th IEEE International Conference on Image Processing, ICIP '09, 1005–08 (2009) ("Achanta"). Final Act. 8–38.

2. Claims 30, 39, and 46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hong, Drucker, Avidan, Achanta, Razdan et al. (US 2005/0168460 A1; Aug. 4, 2005) ("Razdan), and Shiri Gordon and Hayit Greenspan, *Segmentation of Non-convex Regions Within Uterine Cervix Images*, 2007 4th IEEE International Symposium on Biomedical Imaging: From Nano to Macro, 312–15 (2007) ("Gordon"). Final Act. 39–42.

3. Claims 31, 40, and 47 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hong, Drucker, Avidan, Achanta, Razdan, Gordon, and Adachi et al. (US 2005/0216237 A1; Sept. 29, 2005) ("Adachi"). Final Act. 43–44.

Issue on Appeal[2]

Did the Examiner err in finding the proposed combination of references teaches or suggests "select[ing] a seam of pixels within the seam of superpiexels" [sic], as recited in claim 29?

[2] We only address this issue, which is dispositive. We do not address additional issues raised by Appellants' arguments.

ANALYSIS[3]

Appellants assert the Examiner failed to articulate a reasoning for how the cited references of Hong, Drucker, Avidan, and Achanta could be combined to teach or suggest selecting a seam of pixels within a seam of superpixels. App. Br. 9–12; Reply Br. 3–4. In particular, Appellants argue that, contrary to the claim language which requires selecting a seam within a seam (i.e., a seam of pixels within a seam of superpixels), the prior art does not teach or suggest the claimed nesting of seams. App. Br. 12.

Drucker teaches that partitioning an image into superpixels was well-known as an important step in video pre-processing. Drucker 55. Further, Drucker teaches the use of seam carving as an algorithm to extract (i.e., select) a path across (or down) an entire image. Drucker 56. Thus, the Examiner finds, and we agree, Drucker teaches selecting a seam of superpixels (i.e., a plurality of pixels) in the image extending across a dimension of the image. Final Act. 9–10; Ans. 3–4.

Avidan also teaches the use of seam carving to resize an image. Avidan ¶ 26. Avidan further teaches a seam "refers to a set of pixels along a path from one edge of the image (e.g., the top of the image) to the opposite edge of the image (e.g., the bottom of the image)" wherein the seam is monotonic and the pixels are "connected" to each other. Avidan ¶¶ 26–28. Thus, the Examiner alternatively finds, and we agree, Avidan, in combination with Drucker, also teaches selecting a seam of superpixels (i.e.,

[3] Throughout this Decision, we have considered the Appeal Brief, filed February 29, 2016 ("App. Br."); the Reply Brief, filed August 30, 2016 ("Reply Br."); the Examiner's Answer, mailed June 30, 2016 ("Ans."); and the Final Office Action, mailed July 29, 2015 ("Final Act."), from which this Appeal is taken.

a plurality of pixels) in the image extending across a dimension of the image. Final Act. 10–11; Ans. 4–5.

Achanta is directed to saliency detection for content-aware image resizing. Achanta, Title. Achanta teaches an approach based on seam carving using saliency maps to preserve visually prominent features during image resizing operations. Achanta, Abstract; *see also* Achanta 1007 (Section 5: Improved Seam Carving).

In rejecting claim 29, the Examiner relies on the combined teachings of, *inter alia*, Drucker, Avidan, and Achanta to find a person of ordinary skill in the art would have implemented the teachings of Achanta to use a saliency map in "identifying a seam of pixels, within, for example, a seam of superpixels" to remove as having less value with respect to the entire image. Final Act. 14.

In the Answer, the Examiner finds the combined teachings of Drucker and Avidan suggest selecting a seam of pixels within a seam of superpixels. Ans. 5–8 (citing Avidan ¶¶ 30–35, Drucker 55–56). The Examiner finds it would have been obvious to modify the references to achieve the claimed limitation. Ans. 7.

Although we agree the identified references teach selecting a seam of superpixels in an image, we find the Examiner has not provided sufficient evidence or technical explanation that the combination of references teaches or suggests selecting a seam of pixels within a seam of superpixels (i.e., nested seams), as claimed.[4]

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[4] We note, as originally filed, claim 1 (now claim 29) recited, in relevant part, "(iii) select a seam of pixels in the target region, the seam of pixels extending across the dimension of the image." Spec. 19. This language is

For the reasons discussed *supra*, we are constrained by the record before us and do not sustain the Examiner's rejection of claim 29. For similar reasons, we do not sustain the Examiner's rejection of independent claims 38 and 45, which recite similar limitations. Additionally, we do not sustain the Examiner's rejections of claims 30–37, 39–44, and 46–53, which depend therefrom.

DECISION

We reverse the Examiner's decision rejecting claims 29–53.

REVERSED

consistent with the disclosure of the Specification. *See* Spec. ¶ 17, Fig. 2 (items 206, 210). On June 26, 2015, Appellants amended the claim language to its current form. Amend. at 3. In the event of further prosecution, we invite the Examiner to determine whether the amended claim is supported by the Specification, as required by 35 U.S.C. § 112, second paragraph. While the Board is authorized to reject claims under 37 C.F.R. § 41.50(b), no inference should be drawn when the Board elects not to do so. *See* Manual of Patent Examining Procedure (MPEP) § 1213.02.